Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad - 500107

Internal Seminar

Morphological and Interfacial Engineering of Noble-Metal-Free Electrocatalysts for Hydrogen Generation

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The hunt for clean, sustainable and renewable energy sources is prerequisite of today's world because of severity of environmental pollution and rapid depletion of fossil fuels rising energy demands. In this respect, hydrogen (H_2) is considered as promising alternative energy carrier to conventional fossil fuels, due to its high specific energy density and causes zero pollution while combustion. Nevertheless, producing H_2 and bringing H_2 economy into reality is a great challenge. Among various hydrogen production approaches, water electrolysis ($2H_2O \longrightarrow 2H_2 + O_2$) assisted by the noble metal catalysts potentially provides an effective approach to acquire high-purity H_2. Yet, high cost of noble metals and high over potentials for the two half-reactions of water electrolysis including hydrogen and oxygen evolution reactions (HER and OER) are generally required to obtain expected reaction rates, which lead to an overlarge required potential. Therefore, designing noble-metal-free electrocatalysts by surface and interface engineering for water electrolysis is significantly desirable in practical realization of renewal energy technologies. In this perspective, my talk will primarily focus on electrochemical water splitting process and discuss recent results on the generation H_2 and advancements realized in this field. In particular, I will present some of the results from my work giving clarity to the role of shape engineered atomically thin transition metal dichalcogenides crystals grown via chemical vapour deposition towards the HER performances. I will also briefly present about the other possibilities of developing noble metal-free electrocatalyst based on transition metals and perovskites for energy applications.

Thursday, Jun 6th 2019

2:30 PM (Tea/Coffee at 2:00 PM)

Seminar Hall, TIFR-H